

We claim:

1. An air purification system for receiving incoming air containing impurities and outputting purified air into ductwork of a building, the system comprising:  
a hood defining a hood outlet in communication with the ductwork;  
a primary filter member mounted to the hood for receiving the incoming air,  
5 removing at least a portion of the impurities therefrom, and outputting a primary airflow; and  
a secondary filter member mounted to the hood at a location downstream of the primary filter for receiving the primary output airflow therefrom, the secondary filter member having a secondary filter media operable to remove impurities from  
10 the primary airflow and output a secondary airflow to the hood outlet that is cleaner than the primary airflow.
- 2 The air purification system as recited in claim 1, further comprising a duct collar connected between the hood outlet and the ductwork to receive the secondary airflow from the secondary filter and forward the secondary airflow to the ductwork.
3. The air purification system as recited in claim 1, wherein the primary air filter operates using centrifugal filtration principles.
4. The air purification system as recited in claim 3, further comprising a collector disposed at one end of the primary filter operable to receive impurities removed from the incoming air.
5. The air purification system as recited in claim 1, wherein the secondary air filter includes inner and outer porous walls defining a bed therebetween packed with a filter media operable to trap therein the impurities removed from the primary airflow.
6. The air purification system as recited in claim 5, wherein the filter media is porous.

7. The air purification system as recited in claim 6, wherein the porous media comprises a silica gel.

8. The air purification system as recited in claim 5, wherein the secondary air filter is operable to collect grease particles and VOC's.

9. The air purification system as recited in claim 5, wherein the filter media is nonporous and defines gaps therebetween that are sized to store the additional impurities therein.

10. The air purification system as recited in claim 9, further comprising a collector disposed at one end of the secondary filter member operable to receive the additional particles therefrom.

11. The air purification system as recited in claim 9, wherein the nonporous media is selected from the group consisting of a glass and metal.

12. The air purification system as recited in claim 5, further comprising a removable outer wall that encloses the bed.

13. The air purification system as recited in claim 1, further comprising a fan operable to draw air through the primary and secondary filter members and out the duct collar.

14. The air purification system as recited in claim 3, wherein the primary filter member further comprises:

an elongated air filter chamber having a closed front, rear and closed opposing ends;

5 a pair of inlets formed in said air filter chamber front, each inlet of said pair of inlets being located adjacent one of said air filter chamber ends; and

an outlet formed in said chamber rear and located substantially midway between the opposing ends, wherein air enters said air filter chamber through said inlets and flows longitudinally toward said outlet through said air filter chamber in a  
10 helical path, wherein said helical path causes impurities in said air to impinge upon

walls of said air filter chamber prior to said air exiting said air filter chamber through said outlet.

15. The air purification system as recited in claim 1, wherein the secondary filter member further comprises at least one chamber having a front face for receiving incoming air, wherein the chamber is defined by porous walls that are packed with a filter media, and wherein the porous walls extend outwardly from the front face.

16. An air filter chamber comprising:

a top wall;

a pair of side walls extending inwardly from outer ends of the top wall at one end and having distal ends at an opposite end; and

a front face defined by distal ends of the side walls configured to receive incoming impure air and direct the air into the top wall and side walls;

wherein the top and side walls are defined by inner and outer porous members enclosing a filter media therein; and

wherein the side walls extend substantially perpendicularly outwardly from the front face.

17. The air filter chamber as recited in claim 16, wherein the inner and outer porous members are spaced apart by a distance less than one inch.

18. The air filter chamber as recited in claim 16, wherein the inner and outer porous members are spaced apart at a distance which does not allow a pressure drop greater than 2 in H<sub>2</sub>O.

19. The air filter chamber as recited in claim 16, wherein the filter media comprises a porous material.

20. The air filter chamber as recited in claim 19, wherein the filter media comprises a silica gel.

21. The air filter chamber as recited in claim 19, wherein the filter media comprises a ceramic.

22. The air filter chamber as recited in claim 16, wherein the filter media comprises a nonporous material.

23. The air filter chamber as recited in claim 22, wherein the filter media is selected from the group consisting of glass and metal.

24. The air filter chamber as recited in claim 16, further comprising a pair of end walls disposed at distal ends of the inner and outer porous members to seal the filter media therein.

25. The air filter chamber as recited in claim 24, wherein at least one of the end walls is removable.

26. A method of removing impurities from an airflow in an air purification system disposed upstream of a building's ductwork, the air purification system being of the type having a primary filter and a secondary filter, the steps comprising:

(A) drawing incoming air having air impurities into the primary filter;

(B) removing air particles from the incoming airflow at the primary filter to produce a primary airflow;

(C) outputting the primary airflow to the secondary filter;

(D) removing air particles from the primary airflow at the secondary filter media to produce a secondary airflow; and

(E) outputting the secondary airflow into the ductwork.

27. The method as recited in claim 26, wherein step (B) further comprises subjecting the incoming air to centrifugal forces.

28. The method as recited in claim 26, wherein step (D) further comprises the step of directing the primary airflow into a packed bed of filter media.

29. The method as recited in claim 28, wherein the filter media comprises a plurality of porous beads, wherein step (D) further comprises the step of absorbing impurities from the primary airflow into the beads.

30. The method as recited in claim 29, wherein the porous beads are made of a silica gel.

31. The method as recited in claim 28, wherein the filter media comprises a plurality of nonporous beads defining air gaps therebetween, and wherein step (D) further comprises the step of absorbing impurities from the primary airflow into the air gaps.

32. The method as recited in claim 31, wherein the nonporous beads are selected from the group consisting of glass and metal.

33. In an air purification system for removing airborne particles from an airflow prior to emitting the airflow into a buildings ductwork, the system including a hood defining a space for receiving incoming air having impurities and an outlet connected to the ductwork, and a primary filter mounted to the hood within the space, wherein the primary filter receives the incoming air and removes impurities prior to outputting once-filtered air towards the outlet, the improvement comprising:  
a secondary filter mounted within the hood and disposed within the space at a location downstream of the primary filter, the secondary filter operable to receive the once-filtered air from the primary filter and further remove airborne particles to output twice-filtered air towards the outlet.

34. The improvement as recited in claim 33, wherein the primary and secondary filters are angularly mounted within the hood.

35. A method of fabricating a two stage air purification system operable to receive incoming air having air impurities and outputting twice filtered air into the ductwork of a building, the steps comprising:

providing a hood defining a hood outlet that is connectable to the ductwork, wherein the hood has a first filter mounted thereto to receive the incoming air and output once-filtered air toward the outlet; and

mounting a second filter to the hood at a location downstream of the first filter to receive the once-filtered air and output the twice-filtered air toward the hood outlet.

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